CLINICAL NUTRITION

Dietary Management of Geriatric Dogs and Cats

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During their aging process, dogs and cats experience significant alterations in nutrient utilization and develop a heightened sensitivity to both nutrient excesses and deficiencies as well as abrupt dietary changes. At five to seven years of age in either species, these nutritional changes become clinically important. Larger-breed dogs typically experience the need for dietary alterations earlier than do cats and smaller dogs. Inadequate consideration of these changing requirements increases the risk of nutritionally related disease in older dogs, directly reducing quality and length of life.

Altered Nutrient Requirements

Current medical evidence indicates that nutrient requirements in older cats approximate those of their young adult counterparts. Geriatric cats are more sensitive to nutrient imbalances, however, and suffer from many of the same life-shortening illnesses that affect geriatric dogs. Therefore, the quality and quantity of the diet fed to older cats have important medical ramifications.

Several important physiologic changes are responsible for the altered nutrient requirements that occur with aging. Reductions in physical activity and lean body mass result in a decreased metabolic rate and reduce caloric needs for maintenance by approximately 20%. These changes represent the primary reasons that nearly 40% of our aged pet population is obese. Animals weighing more than 15% above their optimum body weight have been linked with startling increases in the incidence of life-threatening diseases. One recent study showed increases of 74% in cases of heart disease, 67% in cases of musculoskeletal disease, 50% in tumors diagnosed, and 40% in skin problems seen in obese dogs.[1]

In contrast, some older pets have reduced appetite and reduced digestive-absorptive capacity, resulting in inability to maintain optimal body weight. Smell and taste may be diminished with aging. These changes reduce an animal's desire to eat. Maintenance of good oral hygiene is also important. Gingival inflammation and recession from excessive accumulation of plaque as well as oral infections can also reduce food intake. Older animals that experience a reduction in saliva production may show further decreases in appetite and oral health.

Aging affects the function of virtually every organ system. Reductions in digestive secretions, absorption, and motility contribute to constipation, flatulence, and abnormal assimilation of nutrients. Reductions in thyroid, adrenal, and exocrine pancreatic functions are also common sequelae of the aging process. In addition, kidney, skin, musculoskeletal, heart, lung, and nervous disorders increase with age. Feeding geriatric animals optimal levels of critical nutrients can reduce the incidence and severity of illnesses related to dysfunction of these organ systems.

Management of Older Pets

There are three major objectives to the management of older animals. They include:

- To slow or prevent onset of disease
- To ameliorate existing problems
- To maintain optimal body weight.

All three objectives can be achieved by medical or surgical intervention, physical activity, and dietary management. Medical or surgical intervention or both can be essential but may also be invasive and hazardous and require continual professional attention. Physical activity, if properly handled, maintains muscle tone, enhances circulation, improves elimination of waste, and reduces obesity. If medically judicious, one or two 15-minute walks daily can be of great benefit to the older dog. For cats, games requiring moderate physical exertion are recommended.

Proper dietary management can have a significant impact on older pets. Ensuring maintenance of optimal nutrient levels in older dogs and cats reduces stress on major body organs and metabolic processes. When properly formulated, diets for geriatric pets contain moderate levels of high-quality protein and have essential fatty acids, vitamins, calcium, zinc, and fiber in amounts greater than suggested for younger adult animals. These diets should *not* contain excessive amounts of phosphorus and sodium (Table I). In addition, cats require restriction of dietary magnesium.

Protein

Proteins are the major source of tissue-building elements in the diet. Specifically, proteins function as components of enzymes, hormones, and antibodies as well as protective and structural tissues and, as such, are essential throughout all phases of an animal's life, even old age. While protein is an essential nutrient, fed in excess it can be detrimental to the older animal, particularly as a major organ function, such as kidney or liver, begins to deteriorate.

When fed in excess of bodily needs, protein cannot be stored but must be used as energy or converted to fat for storage. Dietary protein is metabolized by the liver to a substance called *urea* or *urea nitrogen*. Measurement of urea nitrogen in blood (blood urea nitrogen, or BUN) is a

TABLE I

Nutrient Requirements for the Older Dog

Nutrient	*Maintenance (% dry matter)*	*Geriatric (% dry matter)*
Protein	18–25	15–18
Calcium	0.5–0.9	0.5–0.8
Phosphorus	0.4–0.8	0.4–0.7
Sodium	0.2–0.5	0.2–0.4

routine procedure. Dogs and cats undergoing liver failure may have unusually *low* BUN values, while dogs and cats with chronic renal failure may have unusually *high* BUN values (Figure 1). Feeding high quantities of protein to animals with hepatic disease or renal failure results in development of clinical signs and can seriously compromise the quality of a pet's life.[2]

Because cats are true carnivores, they require larger amounts of dietary protein than do dogs. As a result of the high incidence of kidney disease in older cats, however, their diet should contain high-quality protein at somewhat reduced levels.

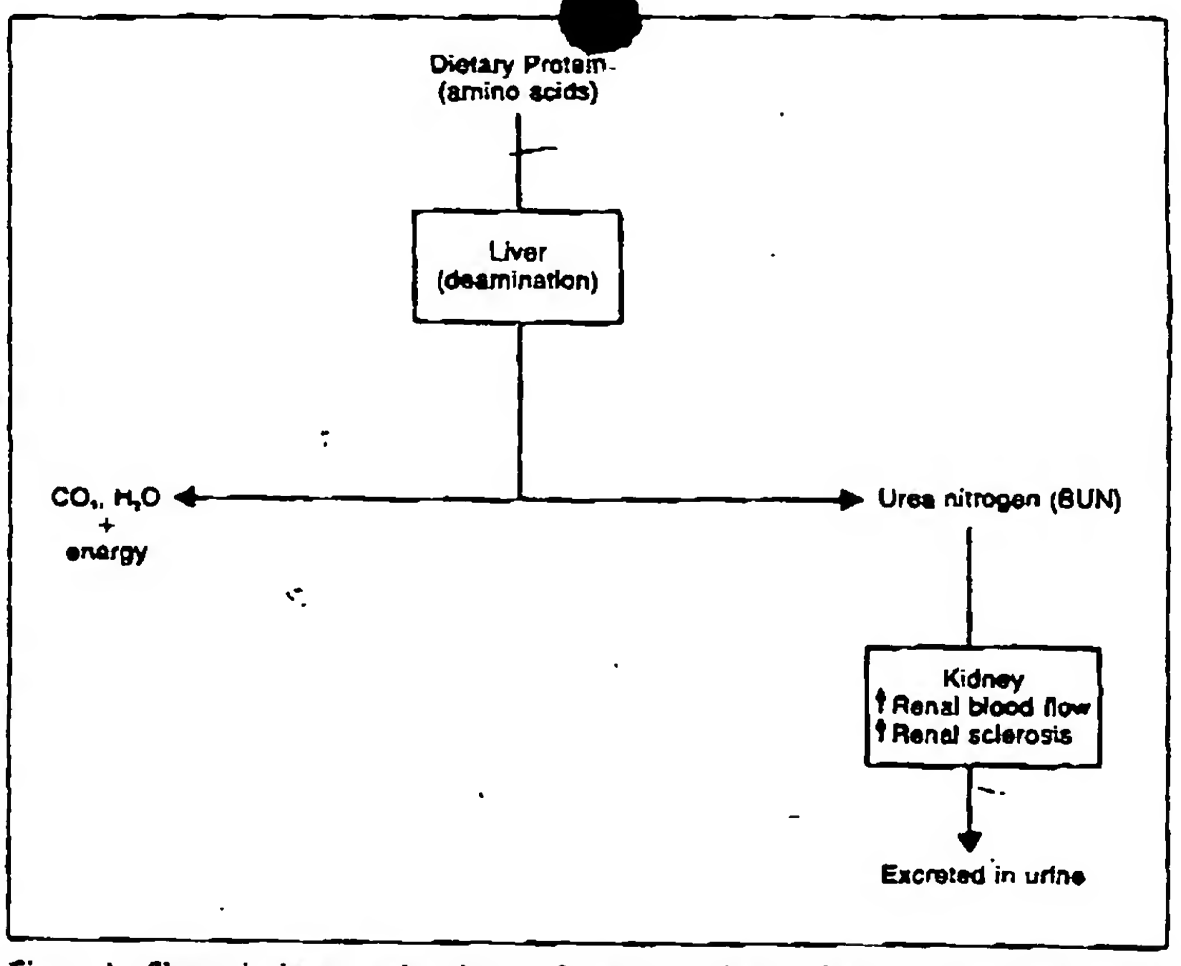

Figure 1—Shown is the normal pathway of energy production indicating the changes that occur in conversion of protein to energy.

Calcium

Calcium requirements may increase moderately with age in dogs because of reduced calcium-absorptive capabilities in the small bowel. Despite the increased dietary requirements, calcium deficiencies are usually only seen in pets fed homemade diets.

Calcium excesses are typically derived from diets formulated for growth (multipurpose diets), diets high in meat and bone meal, or dietary supplements. Clinical signs associated with calcium excess in older dogs include zinc deficiency, reduced thyroid function, and possibly gastric bloat and torsion.

Gastrin secretion is increased by excessive ingestion of calcium, resulting in thickening of the gastric mucosa and delayed emptying of food from the stomach. Recent studies support this hypothesis that chronic excessive dietary calcium may be a risk factor for bloat and torsion in large-breed dogs.[3]

Phosphorus

Improper ratios of calcium to phosphorus can cause secondary nutritional hyperparathyroidism. Low-calcium, high-phosphorus foods include meat or organ tissues (calcium-phosphorus ratio of at least 1:3). Clinical signs of hyperparathyroidism include lameness, spontaneous fractures related to calcium reabsorption from bone to offset high serum phosphorus levels, and renal calcification. Excess dietary phosphorus promotes kidney disease by increasing glomerular filtration rate (increased blood flow to the glomerulus over a sustained period results in glomerular damage and sclerosis) and by promoting calcium and phosphorus deposition in the kidney (resulting from the increased serum levels of these minerals).

Sodium

Many commercial pet foods typically provide sodium at 80 to 150 mg/kg of body weight or from 10 to 20 times the amount required for older animals. Excess sodium promotes retention of fluids, hypertension, and cardiovascular and renal disease. Sodium intake should be restricted to required levels in older animals.

Zinc

Intestinal absorption of zinc declines with age in many dogs. Clinical signs of deficiencies most commonly include reduced appetite and changes in skin and haircoat. Adequate zinc is necessary for normal sensations of taste and smell as well as integumentary health.

Magnesium

Feline urologic syndrome (FUS) represents one of the major medical health care concerns of cat owners. It is estimated that 1 of 10 cats will develop the syndrome in its lifetime. Excessive dietary magnesium is a significant factor in the pathogenesis of feline urologic syndrome. Obesity, reduced physical activity, and neutering have been identified as predisposing factors that increase the incidence of feline urologic syndrome when levels of dietary magnesium are elevated. Because the percentage of cats exhibiting these predisposing factors increases with age, dietary magnesium restriction becomes more important in older cats. The recommended dietary magnesium content should not exceed 0.10% on a dry-matter basis or 20 mg/100 kcal of diet. (Many commercial foods contain one and one-half to three times this amount of magnesium.)

Fiber

Greater dietary fiber content promotes gastrointestinal health in older dogs. In addition, increased fiber moderately reduces total food digestibility, assisting glucose tolerance and promoting proper stool consistency and maintenance of body weight in dogs prone to obesity.

Vitamins

Increased intake of vitamins A, B_1, B_6, B_{12}, and E is indicated in older animals because of changes in the digestive system and metabolism associated with aging. These vitamins also counteract certain aspects of the aging process. SPECIFIC NUTRIENT ALTERATIONS REQUIRED BY OLDER PETS SHOULD NOT BE ATTEMPTED BY SUPPLEMENTING POOR DIETS.

A diet specifically formulated to meet the nutritional needs of older animals should be fed. Because of reduction in digestive and absorptive capabilities in older dogs and cats, a single fixed-formulation diet is recommended.

Indoor pets should be fed in a location separate from the family eating area during the owner's morning and evening meals. This reduces begging behavior as well as the desire of family members to feed table scraps. Older animals that are having difficulty maintaining adequate body weight or showing decreased appe-

ate should be fed a palatable, high-caloric diet specifically formulated for older animals and should be fed frequently. Hand-feeding, warming the food, and adding water to the food will improve palatability. Feeding a proper diet and maintaining optimal body weight throughout an animal's older years can profoundly affect both quality and length of life.

REFERENCES

1. Edney ATB, Smith PM: Study of obesity in dogs visiting veterinary practices in the United Kingdom. *Vet Rec* 118:391-396, 1986.
2. Hostetter TH, Helmut GR, Brenner BM: Compensatory renal hemodynamic injury: A final common pathway of residual nephron destruction. *Am J Kidney Dis* 1:310-314, 1981.
3. Lewis LD, Morris ML Jr, Hand MS: *Small Animal Clinical Nutrition III*. Topeka, KS, Mark Morris Associates, 1987, pp 3-22-3-25.

Bibliography

Branam JE: *Study Guide for Small Animal Dietitian—Level I*. Topeka, KS, Hill's Pet Products, 1987.

Cowgill LD, Spangler WL: Renal insufficiency in geriatric dogs. *Vet Clin North Am* 11:727-747, 1981.

Mosier JE: Canine and feline geriatrics. *Proc AAHA*:153-160, 1978.

This article on clinical nutrition is one of a regular series written specifically for veterinary technicians. The series is designed for the practicing technician as an introduction to and update on the role of nutrition in management and treatment of a variety of clinical disorders that are commonly seen in dogs and cats.